Claims

1. A laser light source comprising:
a cage defining a cavity formed from a plurality of self-assembling protein molecules, and
one or more cargo elements located within the cavity, wherein at least one of the cargo elements defines a cavity that contains a fluid and or a quantum dot,
wherein the cargo element cavity and or its contained fluid internally reflects one or more wavelengths of light in response to an electromagnetic excitation
and
wherein the laser light source emits one or more photons of light in response to a stimulus deforming the cargo element cavity.

2. A laser light source according to claim 1 comprising,
receptors for capturing and positioning cargo elements within the self-assembling protein cavity.

3. A laser light source according to claim 2 comprising,
a vesicle located within the cage and enclosing one or more cargo elements, wherein the receptors extend through the vesicle to capture and position a cargo element within the vesicle.

5. A laser light source according to claim 3 comprising,
adaptors disposed between the receptors and the cage and binding to the receptors.

6. A laser light source according to claim 1 comprising,
a vesicle located within the cage and enclosing one or more cargo elements.

7. A laser light source according to claim 1 comprising,
molecular tethers for capturing and positioning one or more cargo elements within the cavity

8. A laser light source according to claim 1 comprising,
direct cage bonding for capturing and positioning one or more cargo elements within the cavity.

9. A laser light source according to claim 1 further comprising, receptors, molecular tethers and direct cage bonding for capturing and positioning one or more cargo elements within the cavity.

10. A laser light source according to claim 1 further comprising, one or more cargo elements forming a non-permeable cavity.

11. A laser light source according to claim 3 further comprising, a vesicle forming a non-permeable cavity.

12. A laser light source according to claim 3 comprising,
a vesicle defining a cavity located within the cage, wherein a fluid and or a quantum dot are contained in the vesicle cavity.

13. A laser light source according to claim 1, wherein the cage is electrically neutral and inhibits charge transfer between the cage and its enclosed cargo elements.

14. A laser light source according to claim 3, wherein the vesicle is electrically neutral and inhibits charge transfer between the vesicle and its enclosed cargo elements.

15. A laser light source according to claim 4, wherein the receptors and adaptors are electrically neutral and inhibit charge transfer between the vesicle and cage and their enclosed cargo elements.

16. A laser light source according to claim 1, wherein the cage reduces contaminant background radiation to cargo carried within the cage.

17. A laser light source according to claim 3, wherein the vesicle reduces contaminant background radiation to cargo carried within the vesicle.

18. A laser light source according to claim 1 comprising, a self-assembling framework of cages to structurally support one or more self-assembling light sources.

19. A laser light source according to claim 1 comprising a self-assembling electrically neutral substrate of cages to structurally support one or more self-assembling light sources.

20. A laser light source according to claim 1 comprising, a self-assembling framework of cages to structurally order one or more self-aligning light sources.

21. A light source according to claim 1, wherein the one or more cargo elements is a single cargo element. comprising a cargo element that defines a cavity that contains a fluid and or a quantum dot.

22. A light source according to claim 1, wherein the one or more cargo elements are a plurality of cargo elements.

23. A light source according to claim 22, wherein the plurality of cargo elements are light source cargo elements.

24. A light source according to claim 22, wherein the plurality of cargo elements are non-light source cargo elements

25. A light source according to claim 22, wherein at least some of the plurality of cargo elements are light source cargo elements.

26. A light source according to claim 22, wherein at least some of the plurality of cargo elements are light source cargo elements

27. A laser light source according to claim 1, wherein the cargo elements respond to stimuli internal and external to the cage.

28. A laser light source according to claim 3, wherein a vesicle and its contained cargo elements respond to stimuli internal and external to the vesicle.

29. A laser light source according to claim 1, wherein the cargo element-contained ARC fluid and or the vesicle-contained fluid contains one or more dyes of any suitable type, with or without scattering particles, or with or without other dopants.

30. A laser light source according to claim 22, wherein a subset of the cargo elements include one or more liquids without dopants or with one or more dopants.

31. A laser light source according to claim 22, wherein a subset of the cargo elements include a gas or vapor without dopants or with one or more dopants of any suitable type.

32. A laser light source according to claim 1, wherein a cargo element cavity containing one or more quantum dots comprise a photonic dot.

33. A laser light source according to claim 3, wherein a vesicle cavity containing one or more quantum dots comprises a photonic dot.

34. A laser light source according to claim 1, wherein the internal or external deforming stimulus includes one or more stimuli of any suitable type, including but not limited to mechanical, chemical, fluidic, biological, photonic, thermal, sonic, and electrical or electromagnetic stimuli.

35. A laser light source according to claim 1, wherein a spherical cargo element cavity and or a spherical vesicle cavity is deforming in response to an external stimulus, and the so deformed spherical cavity is an asymmetric resonant cavity (ARC)

36. A laser light source according to claim 1, wherein a spherical fluid droplet contained within a spherical cargo element cavity and or contained within a spherical vesicle cavity is deformed in response to a deformed cargo element cavity and or to a deformed vesicle cavity, and the so deformed spherical droplet thereby becomes an asymmetric resonant cavity (ARC).

37. A laser light source according to claim 1, wherein the ARC deforms from a first geometry to a second geometry and the wavelength of the one or more photons is dependent on the second geometry.

38. A laser light source according to claim 1, wherein selectable quantum dot energy emissions are used to tune the Q-value and resonant frequency of the ARC photonic dot.

39. A laser light source according to claim 1, wherein the Q-value (whispering gallery modes) and resonant frequency of the laser are tunable by using an ARC.

40. A laser light source according to claim 1, wherein the ARC is a Q-switched laser.

41. A laser light source according to claim 1, wherein the laser light source is an ultrabright, tunable source of light.

42. A laser light source according to claim 1, wherein there is the ability to couple a high-Q/whispering gallery mode out of the ARC with strong directionality

43. A laser light source according to claim 1, wherein it operates at an ultralow threshold.

44. A laser light source according to claim 1, wherein the laser light source is a regulated source of photons for use in quantum computing, quantum networks and quantum cryptography.

45. A laser light source according to claim 1, wherein the laser light source is a therapeutic agent.

46. A laser light source according to claim 1, wherein the laser light source is a diagnostic agent.

47. A laser light source according to claim 1, wherein the laser light source is a sensor agent.

48. A laser light source according to claim 1, wherein the laser light source is a prosthetic agent.

49. A laser light source according to claim 1, wherein the cage is bioengineered in whole or in part.

50. A laser light source according to claim 1, wherein the self-assembling protein molecule is a clathrin molecule.

51. A laser light source according to claim 1, wherein the cage comprises self-assembling synthetic protein molecules.

52. A laser light source according to claim 4, wherein receptors, adaptors, and vesicle comprise natural or synthetic protein molecules.

53. A laser light source according to claim 4, wherein the receptors, adaptors, and vesicle are bioengineered at least in part.

54. A laser light source according to claim 1, wherein the cage is at least partially coated in a substantially reflective material.

55. A laser light source according to claim 3, wherein the vesicle is coated at least partially in a substantially reflective material.

56. A laser light source according to claim 1, wherein the cage is coated at least partially in a substantially non-reflective material.

57. A laser light source according to claim 3, wherein the vesicle is coated at least partially in a substantially non-reflective material.

58. A laser light source according to claim 1, wherein the cage is at least partially metal coated.

59. A laser light source according to claim 4, wherein the receptors, adaptors, and vesicle are at least partially metal coated.

60. A laser light source according to claim 1, wherein the cage is greater than about one nanometer in diameter.

61. A laser light source according to claim 1, wherein the cage is at least about 50 nanometers in diameter.

62. A laser light source according to claim 1, wherein the cage is at least about 100 nanometers in diameter.

63. A laser light source according to claim 1, wherein the cage is substantially symmetric with respect to a plane.

64. A laser light source element according to claim 1, wherein the cage has substantially icosahedral geometry.

65. A light source according to claim 1, wherein multiple light sources are physically linked together.

66. A light sources according to claim 1, wherein multiple self-assembling light sources are functionally linked together.

67. A laser light source according to claim 1, wherein the laser light source forms a hybrid system upon its physical or functional integration with elements in vitro and in vivo.

68. A method for forming a light source comprising

self-assembling protein molecules into a cage defining a cavity, and locating one or more cargo elements within the cavity, wherein,

at least one of the cargo elements defines a cavity that contains a fluid and/or a quantum dot,

wherein the cargo element cavity and or its contained fluid internally reflects one or more wavelengths of light in response to an electromagnetic excitation.

and

wherein the laser light source emits one or more photons of light in response to a stimulus deforming the cargo element cavity.